

INTERNAL URETHROTOMY IN THE MANAGEMENT OF ANTERIOR URETHRAL STRICTURES: LONG-TERM FOLLOWUP

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ABSTRACT

Purpose: We evaluated the long-term results of internal urethrotomy for anterior urethral strictures.

Materials and Methods: Between 1975 and 1990, 224 patients underwent internal urethrotomy for anterior urethral strictures. Median followup was 98 months (range 60 to 216).

Results: The recurrence rate after 1 urethrotomy was 68% overall, and 58% for bulbar, 84% for penile and 89% for penile bulbar urethral strictures. Repeated urethrotomies did not improve the success rate. Prognostic characteristics of bulbar urethral strictures associated with good results included single or primary strictures, length shorter than 10 mm. and caliber wider than 15F. Preoperative infection and etiology of the strictures did not correlate with results. Multiple urethrotomies achieve only temporary improvement and can be compared to repeated dilations.

Conclusions: Alternative treatments should be considered for penile strictures and after failure of initial urethrotomy.

KEY WORDS: urethral stricture, surgery

Since its introduction in 1974,¹ optical urethrotomy has been considered standard therapy for anterior urethral strictures. Recently, the effectiveness of this technique has been questioned.² A few studies in the literature report long-term results either in favor or against this technique. Long-term followup and objective criteria of evaluation are needed to assess the efficacy of this procedure. We report our results with optical urethrotomy for anterior urethral strictures in 224 patients with a minimum followup of 5 years.

MATERIALS AND METHODS

Between January 1975 and June 1990, 450 patients underwent internal endoscopic urethrotomy for symptomatic anterior urethral strictures. The etiology of the strictures was iatrogenic in 40% of the patients and infection in 29% (table 1). Preoperative assessment included retrograde and voiding urethrocytography, uroflowmetry and urine culture. All preoperative infections were treated with antibiotics.

Using epidural anesthesia and a 20F urethrotome, the urethrotomy was performed under vision with a cold-knife incision of the stricture at the 12 o'clock position according to the technique described by Sachse.¹ An 18 to 20F indwelling latex catheter was left for 24 to 36 hours.

All patients were instructed to perform hydraulic self-dilation for 3 months beginning 15 days postoperatively after a sterile urine culture was obtained. Neither instrumentation nor calibration of the urethra was done during followup. The patients were evaluated postoperatively with uroflowmetry monthly for the first 3 months, every 3 months during year 1 and every 6 months during year 2. After year 2 most patients were followed annually. When the peak flow was less than 15 ml. per second a urethrocytogram was performed to exclude recurrent stricture. Only patients with followup longer than 60 months and a preoperative peak flow of less than 15 ml. per second were included in the series.

RESULTS

According to our selection criteria 224 of 450 patients were evaluable, with followup longer than 60 months and a pre-

TABLE 1. *Etiology of anterior urethral stricture in 450 patients undergoing urethrotomy*

	No. Pts. (%)
Iatrogenic	178 (40)
Infective	129 (29)
Traumatic	18 (4)
Congenital	7 (2)
Unknown	118 (25)
Total No. (%)	450 (100)

operative peak flow of less than 15 ml. per second. The preoperative characteristics evaluated were etiology, site, length, caliber and number of strictures, as well as preoperative infection and initial occurrence. Mean patient age was 62 years (range 11 to 90), median preoperative peak flow rate was 6.8 ml. per second (range 0 to 14.1) and median stricture length was 16 mm. (range 1 to 65). At a median followup of 98 months (range 60 to 216) 188 patients had a peak flow of less than 15 ml. per second: urethrocytography revealed a recurrent stricture in 153, while 35 had obstructive benign prostatic hyperplasia with a normal radiological appearance of the anterior urethra.

The success rate was 32% (71 of 224 patients) overall, and 42% (60 of 142), 16% (6 of 37) and 11% (5 of 45) among patients with bulbar, penile and penile bulbar strictures, respectively. Postoperative complications occurred in 32 patients (11%), including urethral bleeding in 24, extravasation in 6 and chordee in 2. The outcome of the procedure was assessed according to the site of the stricture.

Bulbar strictures. The results obtained with urethrotomy for bulbar urethral strictures were examined in detail. No statistically significant correlation was found between the incidence of recurrence and preoperative treated infection or etiology of the stricture (table 2). When the stricture was shorter than 10 mm. the success rate was 71% (46 of 65 cases), versus only 18% (14 of 77) for longer strictures ($p < 0.001$). The success rate was 69% (24 of 35 cases) and 34% (36 of 107) for strictures more than and less than 15F in caliber, respectively ($p < 0.001$). A good result was obtained in 55 of 110 single (50%) versus 5 of 32 multiple (16%) strictures ($p = 0.001$).

For primary (previously untreated) strictures success was

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TABLE 2. Results of urethrotomy for bulbar urethral strictures according to etiology

	Total No. Pts. With Bulbar Stricture	No. Success (%)
Iatrogenic	63	26 (42)
Infective	42	20 (48)
Traumatic	6	1 (16)
Congenital	3	2 (66)
Unknown	28	11 (39)

obtained in 60 of 129 patients (47%) and urethrotomy failed in all 13 with a recurrent bulbar stricture ($p = 0.003$). These results are summarized in table 3. The success rate in select patients with a single, short, primary bulbar stricture was 77% (46 of 60).

Penile and penile bulbar strictures. For strictures involving the penile urethra no statistical correlation was found between the results and stricture characteristics. The only statistically significant difference was noted for single versus multiple strictures (table 3).

Overall. Recurrence was noted in 86 of 153 patients (56%) within 12 months, 34 (26%) within 24 months, 12 (8%) within 24 to 36 months, 11 (7%) within 36 to 50 months and 10 (6%) more than 60 months after urethrotomy. Secondary urethrotomy was done in 34 patients, urethroplasty in 23, implantation of a permanent endourethral prosthesis in 13 and periodic urethral dilation in 25. A total of 58 patients refused further treatment, the majority of whom (45) had a peak flow of 10 to 15 ml. per second. Overall, 4 of 71 patients with a recurrent penile and 41 of 82 with a recurrent bulbar urethral stricture had a peak flow of 10 to 15 ml. per second, with radiological and endoscopic evidence of recurrent stricture. After secondary urethrotomy only 2 of 11 patients with a bulbar urethral stricture achieved good results, while all patients with penile or penile bulbar strictures had recurrence. A third urethrotomy failed in all patients (table 4).

DISCUSSION

Urethrotomy has been considered an effective treatment for urethral strictures for more than 15 years, with a success rate of 56 to 95%.³⁻²⁶ After a thorough review of the literature it is clear that criteria for evaluation of urethrotomy results are not standardized. Some authors evaluate results mostly by subjective criteria,^{4,6-8,11,20,22} while others assess results according to peak uroflowmetry. The lower limit of treatment failure is 15 ml. per second in some studies,^{3,5,9,18,19,24} compared to 10,¹⁰ 8,¹¹ or 6²³ ml. per second in others. A maximum flow of less than 10 ml. per second is 96% accurate in diag-

TABLE 3. Results of urethrotomy according to characteristics of bulbar urethral strictures

Characteristics	Bulbar Strictures		Penile and Penile Bulbar Strictures	
	No. Success/Total (%)	p Value	No. Success/Total (%)	p Value
Stricture caliber:				
Less than 15F	36/107 (34)	<0.001	6/64 (9)	0.087
More than 15F	24/35 (69)		5/18 (28)	
Stricture length (mm.):				
More than 10	14/77 (18)	<0.001	4/53 (8)	0.093
Less than 10	46/65 (71)		7/29 (24)	
No. strictures:				
1	55/110 (50)	0.001	6/17 (35)	0.013
Multiple	5/32 (16)		5/65 (8)	
Infection:				
Yes	14/33 (42)	0.840	0/7 (0)	0.597
No	46/109 (42)		11/75 (15)	
Stricture presentation:				
Primary	60/129 (47)	0.003	11/69 (16)	0.268
Recurrent	0/13 (0)		0/13 (0)	

TABLE 4. Results after multiple urethrotomies

Stricture Site	No. Procedures	No. Pts.	No. Success
Bulbar	2	11	2
	3	3	0
	4	2	0
Penile and penile bulbar	2	23	0
	3	6	0
	4	2	0

nosing urethral strictures.²⁷ Approximately 50% of strictures with a caliber larger than 18F are symptomatic.²⁸ The maximum uroflowmetry limit of 15 ml. per second should be effective in detecting clinically significant recurrent urethral strictures.

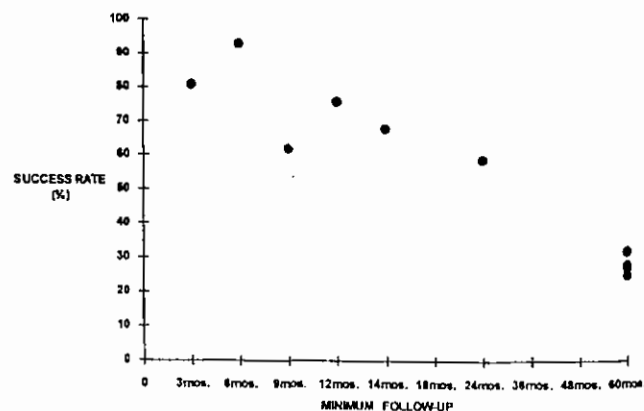
Only a few series have a minimum followup of 12 months,^{9,11,13,17,21} and a minimum followup of 24 months is rare.²⁴ In our study 44 and 18% of the recurrent strictures were noted after more than 12 and 24 months of followup, respectively. A few strictures recurred 7 to 8 years after urethrotomy. Other series have confirmed the possibility of recurrence long after urethrotomy.²⁹ A minimum followup of 5 years is required to assess results of treatment of urethral strictures. When only series in which success was defined as a peak flow of more than 15 ml. per second are considered, the success rate appears to depend greatly on the length of minimum followup (see figure).^{3,5,9,18,19,24,30-32}

In 1981 a study evaluating the results of urethrotomy by retrograde urethrography revealed an 80% failure rate (24 of 30 cases).³³ In 1982 Gibod and Le Portz noted that with prolonged followup the success rate of optical urethrotomy was only 25%.³⁴ More recent small series have revealed a discouragingly high recurrence rate with long-term followup after optical treatment of urethral strictures. Giannakopoulos and Kammenos obtained good results in only 25 of 70 patients (36%) after 5 years of followup.³⁰ Charbit et al reported a 5-year success rate of 26%.³⁵ Others achieved good results in 25 to 28% of patients treated with urethrotomy, with a minimum followup of 5 years.^{32,35}

Most physicians generally perform 2 to 3 repeated urethrotomies before reporting final results.^{3,6,8,11,18} In some series 7 to 10 procedures have been performed in the same patient.^{22,23} Only 2 of our 47 patients treated with multiple urethrotomies achieved a good result and a third or fourth urethrotomy always failed.

CONCLUSIONS

Preoperative characteristics of the stricture, such as site, number, length and caliber, can be useful in selecting the



Success rate of urethrotomy (peak flow more than 15 ml. per second) according to minimum followup in our and other reports.^{3,5,9,18,19,24,30-32}

appropriate treatment. Our 86% recurrence rate after urethrotomy for strictures of the penile and penile bulbar urethra was disappointing. For most severe strictures involving the penile urethra open surgery is the best initial option. Optical urethrotomy remains the first line treatment for primary, single, short strictures of the bulbar urethra and a high success rate (77%) can be expected. According to our results, multiple urethrotomies achieve only temporary improvement as do repeated dilations. After failure of the initial urethrotomy alternative treatments should be considered.

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